NOTES ON MITES ATTACKING ORCHARD AND FIELD CROPS IN UTAH[1]

During the summers of 1915 and 1916 while making investigations for the laboratory of the American Smelting & Refining Company, Department of Agricultural Investigations, I found certain mites to be particularly abundant and destructive to grains in Utah.

The most important of these was the common *Tetranychus bimaculatus* Harvey, which Ewing believes is the same as *T. telarius* Linn. The host list for this species, as Ewing has pointed out, is a long one, and it is an important pest on a surprisingly large number of crops. In 1916 it was so abundant in orchards that many cherry trees were completely defoliated before the end of August, and apricot, pear, plum and apple trees were only a little less seriously affected. Raspberry and currant bushes suffered severely, some of them losing all of their leaves. Peas, beans, tomatoes and other kinds of garden truck showed more or less injury in all stages of their development, and in one field of sugar beets, I found many leaves drying and turning brown on account of the attacks of this mite. The loss of the foliage of many ornamental plants, while not of so much economic importance, was, of course, a very annoying thing.

Corn probably suffered more than any other field crop. In many fields practically every plant suffered the loss of some of its leaves, and in other places all of the leaves turned brown and became thoroughly dry because of the presence of the myriads of mites that covered the undersides of the leaves. The parts of the fields where the soil was lighter and dryer usually suffered most, but no parts seemed to be immune from the attacks of this pest. The suckers and lower leaves were the first to be attacked and to show the brown spots or streaks where colonies of the mites were feeding. When the trouble went no further it was of but little economic importance, but when the upper leaves were attacked and practically all destroyed the plant withered and was not even good for fodder.

[1] Contribution from the laboratories of the American Smelting and Refining Co., Department of Agricultural Investigations.

Many wheat fields also sustained considerable losses due to the attacks of the same mite. The wheat plants would usually be attacked a short time before the head burst from the sheath and when the infestation was bad the leaves would become dry and brown at the point of attack and the portion of the leaf beyond this would droop down and dry out. Often all of the leaves would be affected in this way and the heads, if they developed at all, would be small and poorly filled.

Earlier in the season, while the wheat plants were much smaller, they were often attacked by two other species of mites. One of these is the well-known clover mite, *Bryobia pratensis*. The other has been called the jumping mite on account of its habit of quickly folding its legs and dropping from the plant when disturbed. Banks in *Proc. Ent. Soc. Wash.*, Vol. 14, p. 97, named this species *Tetranychus longipes*. A letter dated June 29, 1915, says that he now places it with two others in a new genus, *Tetranobia*. He refers to this genus again in his bulletin on "The Acarina or Mites" (Rept. No. 108, U. S. Dept. Agric. Office of Sec., pp. 33 and 38) but the formal description of the genus has not yet been published. The common name, jumping mite, is somewhat misleading, for the mite does not actually jump, but, when alarmed, it folds its legs quickly and may thus be thrown a short distance from the spot where it was feeding. In fields where the mite is abundant the leaves turn distinctly gray and many of them become so dry that the growth of the plant is seriously affected. Both *B. pratensis* and *Tetranobia longipes* were found destructively abundant not only on wheat, but on barley, oats and many wild grasses.

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THE OCCURRENCE OF MANNITE IN SILAGE AND ITS POSSIBLE UTILIZATION IN THE MANUFACTURE OF EXPLOSIVES

During the course of our investigations on the fermentation processes that occur immediately after the ensiling of corn, and the chemical products resulting therefrom, it was found

that mannite could be isolated from practically every sample of normal corn silage. The alcoholic extract from dried silage yielded, on evaporation, considerable amounts of mannite, which after one recrystallization gave the characteristic crystals melting at 168–169°. That the presence of mannite can not be considered a local phenomenon is shown by the fact that silage samples obtained from a number of other states in the middle west all contained mannite. The only previous reference to the occurrence of mannite in silage is in a paper by Manns,[1] published a quarter of a century ago. In his work, however, only one sample of silage was examined and the approximate amount of mannite found was not stated.

The following table shows the amount of mannite actually isolated by us from samples of silage obtained from various sources:

Date	Source	Material	Mannite. (Per Cent. on Air-dry Basis)
Feb. 20	Iowa	Corn silage juice	1.30
Mar. 14	Wisconsin	Corn silage	1.70
Mar. 20	Nebraska	Corn silage	2.07
Mar. 21	Minnesota	Corn silage	2.51
Mar. 27	Minnesota	Corn silage	1.47
Mar. 27	Illinois	Corn silage	2.15
Mar. 23	Missouri	Silage from immature corn	0.52
Mar. 20	Kansas	Cane silage	3.30
May 17	Montana	Sunflower silage	5.61
Apr. 16	Arkansas	Corn and cowpea silage	none
Mar. 2	Illinois	Sweet clover silage	none
May 11	Iowa	Ensiled corn stover + sucrose 30 days	3.04
Feb. 21	Iowa	Ensiled corn stover + sucrose 13 days	2.12
May 27	Iowa	Ensiled green corn 10 days	1.72
Feb. 21	Iowa	Ensiled corn stover + glucose 30 days	none

It will be noted that the highest percentages of mannite are to be found in the sunflower silage, the cane silage and the experimental corn silage to which sucrose had been added. Evidently the mother substance of the mannite is sucrose, or more specifically its fructose moiety.

The production of mannite no doubt reaches a maximum soon after filling the silo and then some loss probably occurs, owing to further bacterial activities. However, the amount of mannite is still considerable when the silage is several months old.

If it is desired to prepare quantities of mannite without reference to an approximately quantitative yield, the method may be much simplified. The silage is put in a powerful press, the juice filtered, evaporated to about one sixth of its volume and two or three volumes of alcohol added. The mannite then crystallizes out, and the alcohol can be recovered in the usual way. In this manner it should be possible to extract the mannite on a large scale at very little cost. The pressed residue and the mother liquor could be combined and used for feeding in place of the original silage, since practically nothing would be removed but the mannite and the volatile acids.

Mannite yields a nitration product very similar in properties to nitroglycerin. According to Sanford,[2] "Nitromannite is more dangerous than nitroglycerin, as it is more sensitive to shock. It is intermediate in its shattering properties between nitroglycerin and fulminate of mercury. . . . It is not manufactured upon the commercial scale."

The reason nitromannite is not made commercially is probably the prohibitive cost of mannite. Prepared by the above method from silage, mannite should be even cheaper than glycerin, especially if the residues are utilized as cattle feed. The thousands of tons of silage used every year by the farmers of this country could be made to yield a valuable by-product if treated by this simple process.

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[1] Illinois Ag. Exp. Sta. Bulletin, No. 7, pp. 190–193.

[2] Nitro-Explosives, p. 110, D. Van Nostrand Co., 1906.

THE NORTH CAROLINA ACADEMY OF SCIENCE

THE sixteenth annual meeting of the North Carolina Academy of Science was held at the University of North Carolina on Friday and Saturday, April 27 and 28, 1917. At 2:30 P.M. the executive